CLAIMS

What is claimed is:

1. A reconfigurable adaptive circuit matrix comprising:

at least one sheet of dielectric material;

a plurality of secondary electronic circuits arranged in a matrix and supported on or within each said dielectric material, one or more said secondary electronic circuits affected by at least one characteristic of said dielectric material;

an external switch means for electrically activating one or more of said secondary circuits when said switch means is activated; and

means for varying said characteristic of said secondary electronic circuits to vary operation.

2. The reconfigurable adaptive circuit matrix of claim 1, wherein said dielectric material is a ferrotunable material.

3. The reconfigurable adaptive circuit matrix of claim 1, wherein one or more said secondary electronic circuits having a voltage adjustable device thereon.

4. The reconfigurable adaptive circuit matrix as in one of claims 1-3, wherein said secondary electronic circuits provide adaptation of radiation or reception characteristics of an electromagnetic coupling arrangement comprising at least one adjustable passive component.

5. The reconfigurable adaptive circuit matrix as in one of claims 1-3, wherein said secondary electronic circuits provide a reconfigurable antenna and said dielectric layer has a non-conducting outer surface, said secondary electronic circuits comprising at least one adjustable passive component and mounted to an antenna substrate.

6. The reconfigurable adaptive circuit matrix as in one of claims 1-3, wherein said secondary electronic circuits provide a reconfigurable antenna and said dielectric layer has a non-conducting outer surface, said secondary electronic circuits comprising at least one adjustable passive component and at least one active component mounted to an antenna substrate.

7. A reconfigurable adaptive circuit matrix comprising:

a plurality of conducting patches;

an electromagnetic coupler;

a plurality of conductive pathways; and

a non-conducting surface arranged in a matrix, said conducting patches supported on said non-conducting surface and electrically interconnected via said pathways, said electromagnetic coupler having a resonant frequency adjusted by said conducting patches.

8. The reconfigurable adaptive circuit matrix of claims 7, wherein said non-conducting surface is a first surface of a dielectric layer having a second surface supporting an electrically conductive layer.

9. The reconfigurable adaptive circuit matrix of claim 8, wherein said dielectric layer comprises a plurality of layers of crystalline polymer.

10. The reconfigurable adaptive circuit matrix of claim 8, further comprising a plurality of active components discretely integrated onto said dielectric layer.

11. The reconfigurable adaptive circuit matrix of claim 8, further comprising an external matrix array of switches for electronically controlling at least one parameter of said reconfigurable adaptive circuit matrix.

12. An electromagnetic reflector including said reconfigurable frequency architecture of claim 7.

13. An electromagnetic absorber including said reconfigurable frequency architecture of claim 7.

14. A sheet-wise, bimorph composited structure comprising:

a pair of spaced outer layers composed of an ultra, high-strain polymer or an acrylic;

a dielectric layer comprising a ferrotunable material whose permittivity is dependent upon applied voltage;

a matrix circuit comprising a plurality of secondary circuits;

means for activating said matrix circuit; and

an adjoining layer comprising a plurality of embedded control switches for varying permittivity of said ferrotunable material, whereby function of said matrix circuit is affected.

15. The sheet-wise, bimorph composited structure of claim 14, wherein said secondary circuits are selectively interconnected via MEMS switches, transistors, thin film transistors, semiconductor devices, photoconductors or optically controlled switches.

16. A sheet-wise, bimorph composited structure comprising:

a pair of spaced outer layers preferably comprising an ultra, high-strain polymer or an acrylic;

a multilayered liquid crystalline polymer having an electronic circuitry and a waveguide connectorization so as to form a matrix circuit;

a dielectric layer comprising a ferrotunable material whose permittivity is dependent upon applied voltage;

a plurality of secondary circuits;

means for activating said matrix circuit; and

a matrix configured digital controller whose small signal outputs are coupled to said matrix circuit.

17. The sheet-wise, bimorph composited structure of claim 16, wherein said secondary circuits are selectively interconnected via MEMS switches, transistors, thin film transistors, semiconductor devices, photoconductors or optically controlled switches.

18. An electromechanical coupler mechanism comprising:

a dielectric material having a first surface and a second surface;

an electrically conducting layer substantially adjacent to said first surface of said dielectric material; and

a plurality of electrically conducting patterns supported by said second surface of said dielectric material, said electromechanical coupler mechanisms comprising a plurality of regions, a resonant frequency of at least one region being independently adjustable.

19. The electromechanical coupler mechanism of claim 18, further comprising means for varying an electric field across at least a portion of said dielectic material to vary permittivity of said dielectric material.

20. The electromechanical coupler mechanism of claim 18, wherein said resonant frequency of said region is adjusted by varying a dielectric constant of a tunable dielectric.

21. A reconfigurable antenna comprising:

a substrate;

a plurality of addressable antenna elements disposed in a matrix array upon said substrate, said antenna elements having initial fixed antenna characteristics;

a switch means for electrically interconnecting at least two of said addressable antenna elements; and

means for activating said switch means, wherein a plurality of antenna element settings can be selected to alter said antenna characteristics in a desired fashion.

22. The reconfigurable antenna of claim 21, further comprising:

a plurality of individual voltage-controlling switches for applying an electric field in pre-selected regions of said substrate; and

means for switching said voltage-controlled switches to vary permittivity of regions of said substrate thereby varying critical frequency characteristics of said antenna.

23. The reconfigurable antenna of claim 22, wherein said means for controlling power flow to said adjustable components of each said switches is accomplished by means of gating hard switches disposed in a row-column arrangement.

24. The reconfigurable antenna of claim 23, further comprising at least one hard switch controlling electric power delivery to at least one said switch.

25. The reconfigurable antenna of claim 23, wherein said switches control phase relationship between a pair of dielectic patches.

26. The reconfigurable antenna of claim 23, wherein said switches control phase relationship between sub-arrays comprising a plurality of dielectric patches.

27. The reconfigurable antenna as in one of claims 23-26, further comprising an input/output interface between said switches and said hard switches.

28. The reconfigurable antenna as in one of claims 23-26, wherein said dielectric material is a voltage controllable ferrotunable laminate residing on an antenna substrate as part of said dielectric material to form an adjustable element of a passive circuit.

29. The reconfigurable antenna as in one of claims 23-26, wherein voltage control is implemented by a hard switch matrix charge controller altering voltage so as to optimize array pattern characteristics as a function of selective activation of said hard switches and scan angle parameters.

30. The reconfigurable antenna as in one of claims 23-26, wherein said adaptive circuitry is comprised of a plurality of tunable circuits providing control over at least one usable antenna parameter.

31. The reconfigurable antenna of claims 30, wherein said adaptive circuitry comprises a repeating pattern.

32. The reconfigurable antenna as in one of claims 23-26, further comprising a digital controller to apply small signal controls to selected sub-arrays of said hard switches so as to enable an antenna array to effectively comprise independently operating antenna.

33. The reconfigurable antenna as in one of claims 23-26, wherein a single source power supply is gated to each adjustable said soft circuit components to control ON/OFFstate of an array of said hard switches.

34. The reconfigurable antenna as in one of claims 21-26, wherein a set-point antenna parameter is locally controlled via a voltage control oscillator or a phase lock loop.

35. The reconfigurable antenna as in one of claims 21-26, wherein a set-point antenna parameter is locally controlled via a discrete MEMS voltage control oscillator or a phase lock loop.

36. The reconfigurable antenna as in one of claims 21-26, wherein a set-point antenna parameter is locally controlled via a substrate compatible microelectronic circuit voltage control oscillator or a phase lock loop.

37. The reconfigurable antenna of claim 36, wherein a synthetic impedance power supply is used so as to impedance match a load at each individual and sequentially changing said adaptive circuitry.

38. The reconfigurable antenna of claim 37, further comprising a microcontroller circuit having a plurality of programmable microprocessors or digital signal processors, non-volatile RAM, volatile RAM , interface peripherals and clock/timing circuits.

39. The reconfigurable antenna of claim 38, wherein said interface peripherals are comprised of a plurality of digital to analog converter circuits.

40. The reconfigurable antenna of claim 39, wherein interface peripherals are comprised of a plurality of logic circuits so as to provide control signals to a matrix of row-column hard switches.

41. The reconfigurable antenna of claim 40, wherein said logic circuits are comprised of a plurality of programmable logic devices including GAL, PAL, PLD, CPLD or FPGA.